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चूषण उपकरण — विशिष्टि

(दूसरा पुनरीक्षण)

Indian Standard

SUCTION APPARATUS — SPECIFICATION

(Second Revision)

UDC 615·478·76-83 : 616·089·816-72

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

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Price Group 2

Anaesthetic, Resuscitation and Allied Equipment Sectional Committee, MHD 13

FOREWORD

This Indian Standard (Second Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Anaesthetic, Resuscitation and Allied Equipment Sectional Committee had been approved by the Medical Equipment and Hospital Planning Division Council.

This standard was first published in 1968 and revised in 1978. Its second revision has been undertaken to delete the requirements relating to MTP suction apparatus, in view of the publication of the following Indian Standards:

IS 7080 (Part 1) : 1992	MTP suction apparatus : Part 1 Manually operated (*second revision*)
IS 7080 (Part 2) : 1992	MTP suction apparatus : Part 2 Electric-cum-manually operated
IS 7080 (Part 3) : 1992	MTP suction apparatus : Part 3 Electrically operated

Besides, the requirements for electric motors and flame-proof enclosures have been specified in conformity with IS 996 : 1979 'Single phase small ac and universal electric motors (*second revision*)' and IS 2148 : 1981 'Flame-proof enclosures for electrical apparatus (*second revision*)' respectively. The revision also incorporates the additional safety tests relating to creepage distance and clearances and resistance to heat, fire and tracking in accordance with IS 302-1 (1979) 'Safety of household and similar electrical appliances : Part 1 General requirements (*fifth revision*)'.

Several types of suction apparatus are available these days. This standard classifies the suction apparatus according to conditions under which the apparatus is to be used and covers two types of suction apparatus, namely explosion-proof suction apparatus for use in operation theatres where inflammable or explosive gases are likely to be present and portable apparatus for use in locations where inflammable or explosive gases are not present. It covers only the general safety and performance requirements of the suction apparatus without giving any design details so as to avoid the freezing of design.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard
SUCTION APPARATUS — SPECIFICATION
(Second Revision)

1 SCOPE

1.1 This standard specifies the performance, safety and general requirements of electrically-driven suction apparatus for general purposes (excluding MTP purposes) for use in hospitals, on single phase 50 c/s supply not exceeding 250 V.

2 TYPES

2.1 Suction apparatus shall be of two types:

Type 1 — The apparatus with explosion-proof electrical components having totally enclosed construction, mounted on a trolley with castors, suitable for use in hospitals in those locations where inflammable and explosive gases are likely to be present, such as operation theatres.

Type 2 — The apparatus in which the vacuum unit is mounted on a base and provided with a carrying handle, for use in locations where inflammable or explosive gases are not present.

3 REFERENCES

3.1 The Indian Standards listed in Annex A are necessary adjuncts to this standard.

4 MATERIALS

4.1 Metal Parts

The vacuum unit housing and other components (including wetted parts) shall be constructed of materials having suitable corrosion resisting properties or of materials having durable surface finish suitable for giving adequate protection against corrosion under conditions of normal use.

4.2 Rubber Components

The rubber components shall be made of good quality natural or synthetic rubber and shall be capable of ageing in an air-oven for 168 h at 70 ± 1°C without showing appreciable stiffening, softening, cracking or other changes in condition.

4.3 Glass

The glass parts shall be made of transparent glass not having any pronounced tint. They shall be as free as possible from visual defects and shall be reasonably free from internal strain.

4.4 Plastics

The plastics used shall be suitable for the purpose intended.

5 CONSTRUCTION

5.1 Vacuum Unit

5.1.1 The vacuum unit for *Type* 1 apparatus shall be so designed and constructed that it shall be able to create a vacuum up to 500 mm of Hg in 10 s and 700 mm of Hg in not more than 70 s with a minimum free air displacement rate of 25 to 30 l/min, when measured up to 200 metres above sea level for evacuating two jars of 2 litre capacity each. The electrical components shall be housed in a flame-proof enclosure conforming to IS 2148 : 1981. It shall be mounted in such a way as to produce minimum vibrations.

5.1.2 The vacuum unit for *Type* 2 apparatus shall be capable of creating a vacuum up to 450 mm of mercury in 10 s and 600 mm of mercury in 40 s with a minimum free air displacement of 20 l/min, when measured up to 200 metres above sea level. It shall be mounted in such a way as to produce minimum vibrations. The electrical components shall not produce sparks during operation.

5.2 Base

5.2.1 The base frame of suction apparatus shall be made of suitable section and thickness and shall be of such a construction as to provide rigidity to the frame.

5.2.2 For *Type* 1 apparatus, the vacuum unit and the castor wheels shall be fitted on the base frame so as to transfer the load to ground by maintaining maximum stability against tilting of unit.

5.2.3 In case of *Type* 2 suction apparatus, the vacuum unit shall be mounted on a rigid platform provided with a carrying handle. The platform and fittings shall have smooth edges and corners and shall not move while in use. It may be made light weight, so that it is portable and can be used as a bed side suction unit.

5.3 Vacuum Gauge

The vacuum gauge used in suction apparatus shall be of the bourdon tube type conforming to IS 3624 : 1987. It shall be mounted flush in the panel of the housing. The scale marking shall be black on white background. It shall be concentric and give readings in millimetres of mercury column. Other gauges having same accuracy as specified in IS 3624 : 1987 may also be used.

5.3.1 The vacuum gauge shall be mounted on the suction line on patient side of the vacuum control valve. It shall be mounted in such a position that it is easily visible during the use of the apparatus.

5.4 Suction Bottle and Lid

There shall be two suction bottles of 2 litre capacity each. The bottles shall be sufficiently wide-mouthed to facilitate inside cleaning and shall be capable of repeated steam sterilization at not less than 120°C for 20 min. The lid shall be of the pressing type. A suitable mechanism shall be provided for fitting the lid and their connections effectively and quickly to the suction bottle. The lid and its connections to the suction bottle shall be so designed as to provide a leak-proof assembly capable of easy removal and withstanding repeated steam sterilization at not less than 120°C for 20 min. The inlet and outlet pipes shall be so designed and placed as to minimize the possibility of aspirated fluid or froth passing directly from one pipe to the other. The bottles shall be graduated at 50 ml intervals.

5.5 Suction System Filters and Traps

Suitable air filters or water traps shall be provided between the suction bottle and the suction pump to protect the pump from entrained moisture or from flooding due to overflow in suction bottle. The filters shall be designed so that the filtering elements are easily replaceable and traps shall be such that they are easily cleaned. The filter housing and connections shall be easily removable and shall be capable of withstanding repeated steam sterilization at minimum 120°C for 20 min.

5.6 Tubings and Couplings

5.6.1 The suction apparatus shall be provided with a minimum of 2 m length of rubber or plastics tubing as desired by the purchaser. The rubber tubing shall conform to Grade 1, Type A of IS 637 : 1965 and shall be of minimum 10 mm inside diameter. The plastics tubing shall be made from suitable transparent PVC of minimum 10 mm inside diameter. The tubing shall be capable of withstanding the lowest absolute pressure attainable with the apparatus without collapse.

5.6.1.1 The tubing may have antistatic properties, if so required by the purchaser.

5.6.2 The apparatus shall be provided with couplings which shall be leak-proof.

5.7 Castors

The castors shall be normal duty type and of suitable size conforming to IS 4034 : 1979. Antistatic castors may also be provided, if required by the purchaser.

5.8 Electric Motor

The motor used in the suction apparatus shall conform to IS 996 : 1979.

5.9 Switches and Wiring

The switches and wiring used shall be rated to handle the maximum load that may occur under normal operating conditions and continuous use. The switches shall be so placed and fixed as to be convenient to operate and shall not become defective or loose during the operation. They shall be explosion-proof and shall be marked to indicate the 'OFF' and 'ON' positions.

6 GENERAL REQUIREMENTS

6.1 The noise level shall be such that the noise level meter situated at 1.2 m away from the machine does not record an increase greater than 10 dB when the back ground noise level is 45 dB using the instrument in accordance with IS 9779 : 1981 using frequency weighting characteristics A.

6.2 The suction apparatus shall be so designed and constructed that in normal use, its performance is reliable and under faulty conditions it does not endanger the user or the surroundings.

6.3 The suction apparatus shall be so designed as to provide adequate stability. It shall not overturn when placed in the most unfavourable position and uneven load distribution on an inclined plane at an angle of 10° to the horizontal.

6.4 The apparatus shall have adequate mechanical strength and shall be constructed to withstand such rough usage as may be expected in use.

6.4.1 The protective enclosures, guards and the like shall have adequate mechanical strength and shall not be removable without the use of tools.

6.5 The suction apparatus shall be provided with a fine adjustment vacuum control valve placed either before or after the air filter at a convenient and easily accessible place for continuous control of vacuum.

6.6 The suction apparatus shall have a light indicator to indicate that the apparatus is 'ON'.

7 SAFETY REQUIREMENTS

7.1 Each suction apparatus shall satisfy the following safety requirements in accordance with the corresponding clauses of IS 302-1 (1979):

Requirements	*Clause No.*
Protection against electric shock	8
Electrical insulation and leakage current at operating temperature	13
Stability and mechanical hazards	20
Mechanical strength	21
Supply connections and external flexible cables and cords	25
Terminals for external conductors	26
Provisions for earthing	27
Screws and connections	28
Creepage distances and clearances	29
Resistance to heat fire and tracking	30
Resistance to rusting	31

8 WORKMANSHIP AND FINISH

8.1 The suction apparatus shall be free from any imperfections which affect its appearance or impair its performance and serviceability. The apparatus shall operate smoothly and noiselessly and shall efficiently perform its functions in a manner suitable for the purpose intended.

NOTE — It is important that continuity of contact between various metallic parts is maintained. To ensure this, the holes to receive rubber buffers should be drilled and tapped after stoving to remove any enamel or other insulating material, since the antistatic properties of the rubber buffers or lining could be affected by an insulating finish.

8.2 The components made from brass shall be plated chromium over nickel in accordance with service Grade 2 of IS 4827 : 1983.

8.3 All components and the housing made from mild steel or cast iron shall be either plated chromium over nickel in accordance with service Grade 2 of IS 1068 : 1985 or shall be painted in accordance with the procedure given in **8.3.1** to **8.3.3**.

8.3.1 The components shall be pickled, scrubbed and rinsed to remove grease, rust, scale or any other foreign matter.

8.3.2 After pickling, all components shall be given phosphating treatment in accordance with IS 3618 : 1966, followed by a coat of suitable primer conforming to IS 2074 : 1979 for air drying process and IS 2075 : 1979 for stoving process. Filler shall be applied to all surfaces requiring filling.

8.3.3 Two coats of enamel paint shall then be applied as follows:

a) Undercoat, and
b) Finish coat with synthetic stoving enamel conforming to IS 150 : 1950 or IS 151 : 1985, as required by the purchaser.

8.3.3.1 The components shall thereafter be baked suitably in an oven. The resulting finish shall be free from all visible defects and shall satisfy the adhesion test given under **9.1**.

9 TESTS

9.1 Adhesion Test

A square measuring 12 to 15 mm shall be marked over a conveniently selected spot on the painted surface. Cross lines, at a distance of 1 to 1.5 mm apart and inclined at 120°, shall be inscribed over the marked portion with a pointed instrument. Thereafter cellulose tape shall be applied over this portion and left for two minutes; after which it shall be jerked free from the painted surface. If more than 5 percent of the squares are ripped away from the painted surface and are adhering to the cellulose tape, the whole surface of the apparatus shall be repainted and again subjected to this test now at two conveniently selected spots and the item considered passing only if it satisfies in both the cases.

10 ACCESSORIES

10.1 The suction apparatus shall be provided with an automatic voltage corrector conforming to IS 8448 : 1989, if required by the purchaser.

11 INSTRUCTIONS MANUAL

11.1 Each suction apparatus shall be provided with a manual giving necessary instructions and precautions to be taken for its proper use. The instruction manual shall include technical specification of the apparatus and a list of accessories and spare parts supplied with the equipment.

12 MARKING

12.1 The suction apparatus shall be marked clearly and indelibly in accordance with 7 of IS 302-1 (1979) on its outer surface or on a plate firmly attached to it. In addition, there shall be permanent marking at the appropriate position to indicate the following:

a) The direction in which the vacuum control valve shall be turned to obtain an increase in suction;
b) Position of 'exhaust outlet'; and
c) Any other important precaution regarding use of the apparatus, changing of filters and other components.

12.2 BIS Certification Marking

The product may also be marked with Standard Mark.

12.2.1 The use of the Standard Mark is governed by the provisions of Bureau of Indian Standards Act, 1986 and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

13 PACKING

13.1 Each suction apparatus shall be packed individually in one package in accordance with best prevalent trade practices. Packing shall be compact and done in a manner to prevent damage during transit. Suction apparatus may also be packed as agreed to between the purchaser and the supplier.

ANNEX A

(*Clause* 3.1)

INDIAN STANDARDS REFERRED TO IN THE TEXT OF THIS STANDARD

IS No.	*Title*
150 : 1950	Ready mixed paint, brushing, finishing, stoving for enamels, colours as required
151 : 1985	Ready mixed paint, spraying, finishing, stoving, enamel, for general purposes, colour as required (*first revision*)
302-1 : (1979)	Safety of household and similar electrical appliances : Part 1 General requirements (*fifth revision*)
637 : 1965	Rubber tubings for general purposes (*first revision*)
996 : 1979	Single phase small ac and universal electric motors (*second revision*)
1068 : 1985	Electroplated coatings of nickle plus chromium and copper plus nickel plus chromium on iron and steel (*second revision*)
2074 : 1979	Ready mixed paint, air drying, red oxide-zinc chrome, priming (*first revision*)
2075 : 1979	Ready mixed paint, stoving, red oxide-zinc chrome priming (*first revision*)
2148 : 1981	Flame-proof enclosures for electrical apparatus (*second revision*)
3618 : 1966	Phosphate treatment of iron and steel for protection against corrosion
3624 : 1987	Pressure and vacuum gauges (*second revision*)
4034 : 1979	Castors for hospital equipment (*first revision*)
4827 : 1983	Electroplated coatings of nickel and chromium on copper and copper alloys (*first revision*)
8448 : 1989	Automatic line voltage correctors (step type for domestic use) (*first revision*)
9779 : 1981	Sound level meters

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